SIDOROV, P.P., prof.; TYCHINSKIY, L.I., kand. med. nauk

Prevention of high blood losses in the third stage of labor in uterine inertia. Sov. med. 27 no.11:67-70 N '64. (MIRA 18:7)

1. Akushersko-ginekologicheskaya klinika (zav. - prof. P.P.Sidorov) Donetskogo meditsinskogo instituta na baze oblastnoy i klinicheskoy bol'nitsy imeni Kalinina (glavnyy vrach V.F.Zubko), Donetsk.

TYCHINSKIY, L. I., Candidate Med Sci (diss) -- "The problem of the management of the period following birth". Stalino, 1959. 15 pp (Stalino State Med Inst im A. M. Gor'kiy), 220 copies (KL, No 23, 1959, 173)

24.2200,9.2580

77205
SOV/109-5-1-18/20

AUTHOR: Tychinskiy, V. P.

TITLE: Susceptibility of Ferrites at Higher Amplitudes. Brief Communication

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 1, pp 172-175 (USSR)

ABSTRACT: In this study is given a general analysis of susceptibility of ferrites at higher amplitudes when losses are neglected. A tensor of the third order of susceptibility has been introduced, describing the squared terms of magnetization. Starting with the equation of motion:

$$\frac{d\vec{M}}{dt} = -\gamma[\vec{M}\vec{H}] \text{ at } \vec{H} = \vec{H}_0 + \vec{h}(t), \ \vec{H}_0 = \vec{k}H_0$$

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Susceptibility of Ferrites at Higher Amplitudes. Brief Communication

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The expressions are obtained for the components of moment ${}^{2}M^{1}_{1m}$ which are in agreement with equations obtained by J. E. Pippin (see Ref 2 of this abstract). Equations in the Pippin study describe the effects of the shift and of doubling oscillation frequencies when polarization is taken into account. These equations are obtained for harmonically changing field $\vec{h}$. For practical purposes the field $\vec{h}$ is explained as a sum of two circular components with clockwise and counter-clockwise rotations: $\vec{h}(\omega_1) = \vec{h}_1^{+} + \vec{h}_1^{-}$ where $h_1^{+} = h_{1_0}^{+} e^{j\omega_1 t}$; $h_1^{-} = h_{1_0}^{-} e^{-j\omega_1 t}$ are complex amplitudes. In this case the resultant equations for the components of the magnetizing vector M^{1-}_{1m} are given in the form:

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$$-\frac{2M_{lm}^{z}}{\gamma} = (\dot{h}_{m}^{+z} D_{l}^{++} h_{l}^{+} - \dot{h}_{m}^{-z} D_{l}^{--} h_{l}^{-}) + (\dot{h}_{m}^{-z} S_{l}^{-+} h_{l}^{+} - \dot{h}_{m}^{+z} S_{l}^{+-} h_{l}^{-}), \tag{8}$$

$$-\frac{2M_{lm}^{+}}{\gamma} = (\dot{h}_{m}^{z} {}^{+}D_{l}^{z+} h_{l}^{+}) + (h_{m}^{z} {}^{+}S_{l}^{z+} h_{l}^{+}), \tag{9}$$

$$-\frac{2M_{lm}^{-}}{\gamma} = (\dot{h}_{m}^{z} {}^{-}D_{l}^{z-} h_{l}^{-}) + (h_{m}^{z} {}^{-}S_{l}^{z-} h_{l}^{-}). \tag{10}$$

where

$$ {}^{z}D_{l}^{\pm\pm} = \frac{\chi_{l} \pm \varkappa_{l}}{\omega_{l} - \omega_{m}}; \quad {}^{\pm}D_{l}^{z\pm} = \frac{\chi_{l} \pm \varkappa_{l}}{\omega_{H} \pm (\omega_{l} - \omega_{m})};$$

$$ {}^{z}S_{l}^{\mp\pm} = \frac{\chi_{l} \pm \varkappa_{l}}{\omega_{l} + \omega_{m}}; \quad {}^{\pm}S_{l}^{z\pm} = \frac{\chi_{l} \pm \varkappa_{l}}{\omega_{H} \pm (\omega_{l} + \omega_{m})}.$$

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where χ_1 and λ are components of the Polder tensor derived for the harmonically changing field. Coefficients ${}^{k}D_1^{ij}$ and ${}^{k}S_1^{ij}$ may be considered as magnetic susceptibilities of the second order for the sum and difference of frequencies focusing the tensor of the third order. Such an approach to the tensor components permits one to create the parametric theory of the ferrite amplifiers with lumped and distributed constants. There are 2 references, 1 Soviet, 1 U.S. The U.S. reference is: J. E. Pippin, Frequency Doubling and Mixing in Ferrites, Proc. I.R.E., 1956, 44, 8, 1054.

SUBMITTED: January 26, 1959

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9.2571

77781
SOV/109-5-2-14/26

AUTHORS: Tychinskiy, V. P., Derkach, Yu. T., Karpetskiy, V. V.

TITLE: Experimental Investigation of Ferrite Amplifier

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 2, pp 288-295 (USSR)

ABSTRACT: The subject of the present article is a report on tests of a ferrite amplifier (similar to the one M. T. Weiss, was using (see reference end of abstract) under a degenerate electromagnetic regime. A block diagram of the installation is shown in Fig. 1. A magnetron was used as a power supply for excitation, the power level of which was controlled by a thermistor bridge. Its signal was used by the sem-automatic recorder of the power absorption spectrum in the ferrite at excitation frequency. A pulse klyston oscillator was the source of the amplfied pulse signal. The relations measured during the tuning of the ferromagnetic amplifier are shown in Fig. 2.

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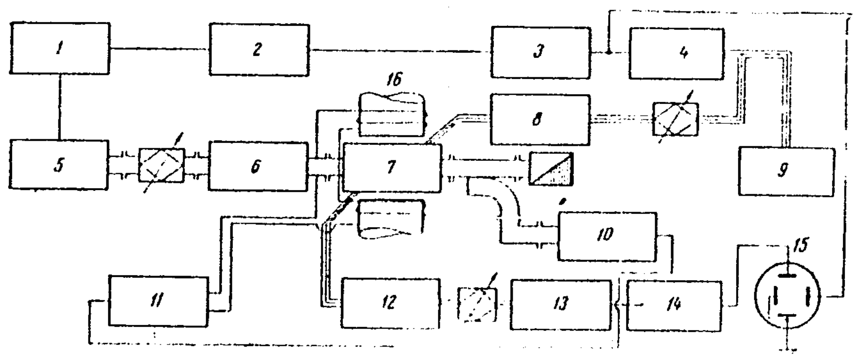

Fig. 1

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Caption to Fig. 1. Block diagram of measuring installation: (1) modulator; (2) pulse generator; (3) pulse generator; (4) klystron block; (5) magnetron; (6) meter; (7) ferrite amplifier; (8) measuring circuit; (9) spectrum analyzer; (10) power meter; (11) semi-automatic recorder; (12) low frequency filter; (13) detector; (14) broad band amplifier; (15) oscillograph; (16) electromagnet.

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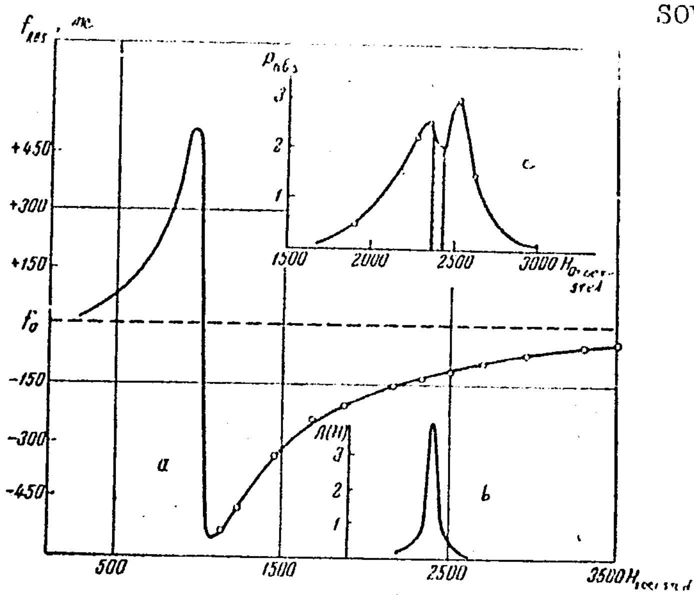

Card 4/15 Fig. 2. See card 5/ for caption

Fig. 2. (caption) Graphs of SHF system tuning of ferrite amplifier: (a) f_{res} of band resonator versus magnetic field H_0; (b) tuning curve of band resonator at signal frequency; (c) curve of power absorption at excitation frequency.

The relation $f_m = 2f_{res}$ (H_0) was maintained with the aid of a spectrum analyzer. For a more effective excitation of the amplifier by the magnetron, a study of power absorption in the system at the excitation frequency was required. Typical curves are shown in Figs. 4 and 5.

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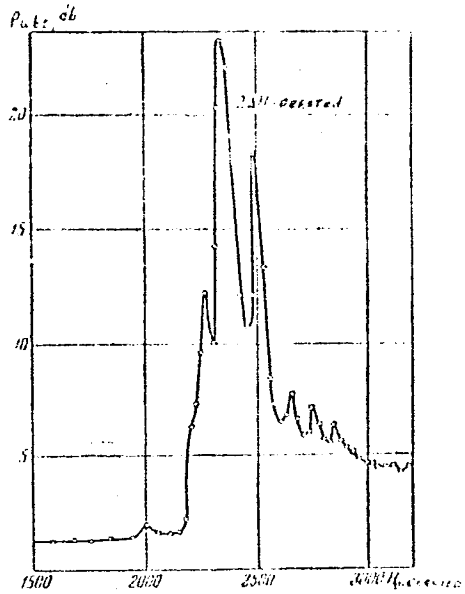

Fig. 4. Curve of power absorption in ferrite at excitation frequency (klystron level).

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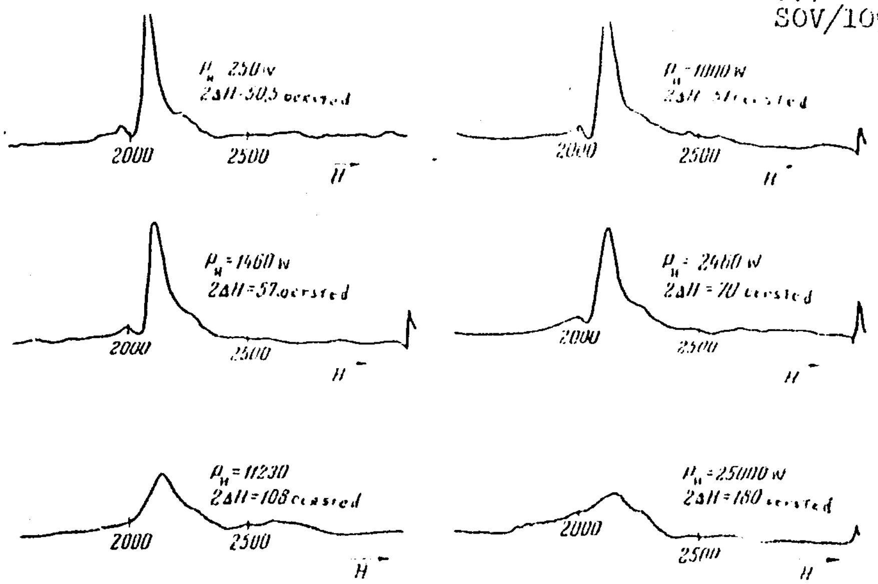

Fig. 5.

Card 7/15 See caption on card 8/15 for Fig. 5.

Caption to Fig. 5.

Fig. 5. Curves of power absorption by ferrite at excitation frequency (magnetron level) (disc 3.8 x 1mm).

It was expected that there would be no noticeable increase in precession angle of magnetization. The experiment proved the opposite. A typical graph (see Fig. 7) shows that precession angle θ calculated according to equation

$$\theta = \frac{h}{2\Delta H} \simeq \frac{0.103\sqrt{P}}{2\Delta H},$$

increases by 2.5 times above the threshold. This permitted a selection of the working point of the power amplifier considerably above the threshold where the resonance curve starts widening. This lowers the demands from the ferrite element.

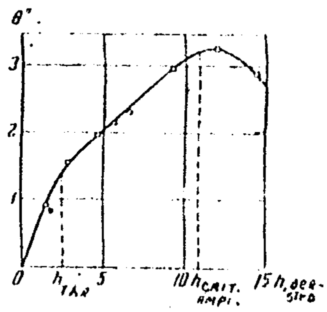

Fig. 7. Saturation of the precession angle θ of ferrite magnetization.

The pulse from the klystron oscillator passing at the time of a powerful magnetron pulse showed a flare as it appears in Fig. 8.

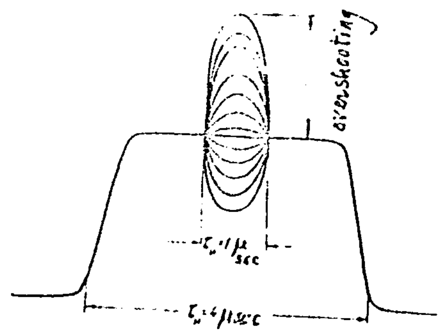

Fig. 8. Pulse of amplified signal on oscillograph screen.

It was found that this flare is not due to tuning or direct passage of excitation power, but is a pulse at signal frequency f_s. The amplification coefficient was measured, and at a 3 db level its dependence on excitation power is shown on Fig. 9. The parametric character of ferrite amplifier was proven by the

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following test

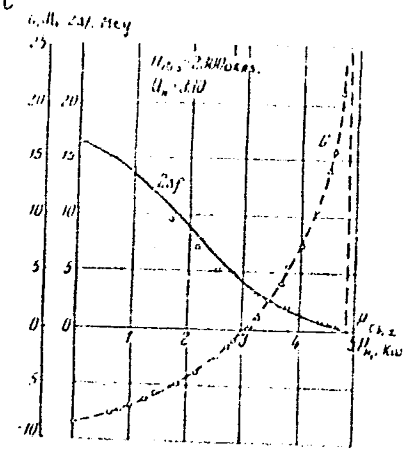

Fig. 9. Amplification, G, and bandwidth $2\Delta f$ versus excitation power P_{excit}.

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One of the ferrite amplifiers was operated as an oscillator and was used as a signal pulse source at frequency $f_m/2$ synchronized with the magnetron. The second device was fed by the same magnetron, underexcited and operated as an amplifier of the first device (see Fig. 11).

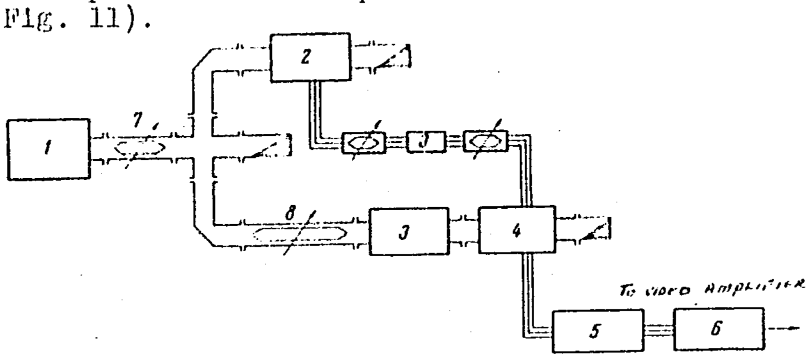

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Fig. 11. See card 13/15 for caption.

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Caption to Fig. 11.

Fig. 11. Block diagram of installation for measuring phase relations: (1) magnetron; (2) ferrite oscillator; (3) phase shifter; (4) ferrite amplifier; (5) filter; (6) detector; (7, 8) attenuators.

When phase φ of the amplified signal changed at the amplifier input, a periodic change in output power was observed. A similar dependence was observed at the change of signal excitation phase. This confirms the parametric theory of ferrite amplifiers. Conclusions: (1) Ferrite amplifiers of regenerative type have a relatively narrow frequency band ($<0.1\%$), decreasing with an increased amplification. (2)

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Relatively high threshold power imposes a pulse regime. A continuous regime may be possible with adequate cooling. (3) The amplifier operation in a regime ($f_s = f_H/2$) shows a phase dependence of amplification. A semistatic operation or work under other electromagnetic conditions eliminate this drawback. (4) The parametric theory of ferrite amplification admits in principle an operation at an excitation frequency lower than that of the signal $f_s = n/2\ f_H$ [illegible] when n>2; however, this requires a considerable increase in excitation power and is impractical. A. [illegible] Popova supplied ferrite monocrystals. There are 12 figures; and 12 U.S. References. The 5 most recent U.S. references are: M. T. Weiss, A Solid State Microwave Amplifier and Oscillator Using Ferrites. J. Appl Phys., 1957, 107, 1, 317; M. T. Weiss, A Solid State Amplifier and Oscillator Using Ferrites. J. Appl. Phys., 1958, 29, 3, 421; W. L. Whirry, F. B.

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Experimental Investigation of Ferrite Amplifier

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Wang, Phase Dependence of Ferromagnetic Microwave Amplifier, Proc. IRE, 1958, 46, 9, 1657; A. D. Berk, L. Kleinmann, E. E. Nelson, Modified Semistatic Ferrite Amplifier, I.E Convention Rec., 1958, 2, August, 9; H. Heffner, K. Kotzebue, Experimental Characteristics of a Microwave Parametric Amplifier Using a Semiconductor Diode, Proc. IRE, 1958 46, 6, 1301.

SUBMITTED: April 16, 1959

Card 15/15

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9.2571

AUTHORS: Tychinskiy, V.P., Derkach, Yu.T., and Karpetskiy, V.V.

TITLE: Experimental Investigation of the Degenerate Regime of a Ferrite Amplifier

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 6, pp 943-954 (USSR)

ABSTRACT: The theory developed by Mandel'shtam, Papaleksi, Divil'kovskiy and Rytov is employed to describe the characteristics of a ferrite amplifier in the degenerate electromagnetic regime. Such an amplifier was proposed by Suhl (Refs 1-3) and constructed by Weiss (Ref 7). At no time did Weiss and others compare the experimental results with the theoretical predictions. Suhl's quasi-linear theory neglects the effect of higher order non-linear magnetisation terms on the amplifier operation and neglects the phase relations between the amplified signal and the excitation, which are essential for the degenerate electromagnetic regime. This analysis is the purpose of the present article. The experimental system permitted the exact realisation of the condition that the pumping frequency is twice the signal frequency.

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Experimental Investigation of the Degenerate Regime of a Ferrite Amplifier

The following partially inter-related questions were studied: determination of the oscillation threshold of the ferrite amplifier and its dependence on the loaded Q of the resonator; the dependence of gain on the excitation power at the most favorable and least favorable phases for operation in reflection; the dependence of amplification and bandwidth on excitation power at random phase in operation in transmission; the dependence of amplification on the phase angle in transmission; comparison of the transmission and reflection loads of the amplifier. Generally good agreement between experimental and theoretical values is obtained, except in the neighbourhood of limiting values of VSWR where parasitic reflections, losses and other forms of non-idealness of the measurement channel have substantial influence. Certain higher-order non-linear effects, outside the scope of the quasi-linear ferrite amplifier theory are noted. At excitation powers somewhat lower than threshold weak oscillations begin. The finite amplitude of oscillation indicates the

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presence of non-linear attenuation terms. The oscillation frequency differs from the optimal frequency of amplified signal at high gain factors (close to the oscillation threshold) and the optimum values of magnetic fields for oscillation and amplified signal do not coincide. These phenomena are ascribed to the effects of signal detection at high amplitudes which causes a change in the longitudinal magnetisation component and a shift in the resonant magnetic field value. At low oscillation amplitudes detection does not occur. A monotonic change of resonant value of magnetic field with increase of excitation power indicates strong detection effects.
There are 10 figures and 11 references, of which 4 are Soviet, 7 English.

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SUBMITTED: June 23, 1959

Tychinskiy V. P.

109-1-14/18

AUTHOR: Tychinskiy V.P.

TITLE: Experimental Investigation of the Electron Conductivity of the Space-Charge Cloud in a Magnetron (Eksperimental'noye issledovaniye elektronnoy provodimosti oblaka prostranstvennogo zaryada v magnetrone)

PERIODICAL: Radiotekhnika i Elektronika, 1958, Vol.III, Nr 1, pp.116-130 (USSR)

ABSTRACT: The problem has been already considered by the author in an earlier work (see Ref.1). Here, the problem is first treated analytically. It is shown that the static radius r_{CT} of the electron cloud as a function of the anode voltage and the magnetic field in a magnetron can be expressed by Eq.(1) or approximately by Eq.(2). On the other hand, the radius of the dynamic stability of the system is expressed by Eq.(4), where ω_K is the critical angular frequency and U_{KP} is the critical voltage. The values of static and dynamic radii as a function of U_a/B^2 are given in Figs.3 and 4. An expression for the internal admittance

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Experimental Investigation of the Electron Conductivity of the Space-Charge Cloud in a Magnetron

components ΔB_{II} and ΔG_{II} for the magnetron is derived in terms of the input impedance of the system, $R + jX$. The expression is in the form of Eqs.(7), where α and γ are two constants. Eqs.(7) permit the evaluation of the internal electron admittance if the reactive and the real components of the input impedance of a measuring link attached to the system are known. A formula for the cyclotron resonance of a cylindrical magnetron is derived and this is in the form of Eq.(12). The measurements were carried by means of the equipment shown in Fig.2. This consisted of: the investigated magnetron (M), (1) a measuring section, (2) a directional switch, (3) an attenuator, (4) a wavemeter, (5) a high frequency generator, (6) a modulator, (7) an oscillograph, (8) a switching device, (9) a potentiometer-type voltmeter, and (1) an electromagnet. Measurements of the input impedance of the magnetron were done by the 3-probe method (Ref.9). In this method, if the detector of a probe has a square characteristic, the input impedance can be determined from:

Experimental Investigation of the Electron Conductivity of the Space-Charge Cloud in a Magnetron

$$\frac{Y}{Z_o} = \frac{\theta_4 - \theta_2}{2\theta_3}, \quad R = \sqrt{|Z|^2 - X^2} \quad \left|\frac{Z}{Z_o}\right|^2 = \frac{\theta_1}{\theta_3} \qquad (15)$$

and the equivalent electron impedance by:

$$\Delta B_{II} = \frac{\alpha}{Z} \frac{\theta_2 - \theta_4}{2\theta_1}; \quad G_o + \Delta G_{II} = \frac{\alpha}{Z_o}\left[\frac{\theta_3}{\theta_1}\left(\frac{\theta_2 - \theta_4}{2\theta_1}\right)^2\right]^{1/2}, \qquad (16)$$

where α is the transformation ratio of the loop, Z_o is the wave impedance of the measuring line and θ-s are the corresponding ordinates of the oscillograms. The experimental results are shown in Figs.3-8. Figs.3 show oscillograms of the detector currents θ_i and of the anode current I_a as a function of the anode voltage U_a. Figs.4 are derived from the oscillograms, taken for B = 850 Oe and

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and B = 1300 Oe, by means of Eq.(7). The shaded portion represents the level of the initial losses in the system and in the external load. The diagram of Fig.5 shows the electron conductivity in the same magnetron as a function of the anode voltage for various values of the magnetic field and various oscillation modes (n = 6). The curves of Fig.6 represent the calculated values of the internal admittance as a function of the electron cloud boundary (ReX_b) ; $ReX_b = 1.6 - nb/r_K$, where n is the mode number and b is the thickness of the cloud; the point $ReX_b = 0$ corresponds to the synchronous layer. Fig.7 gives the calculated and experimental lines of the cyclotron resonances for various values of the cathode emission current, I_s . A diagram of the cyclotron resonances for a different magnetron (Nr 2), plotted in B' and ω/ω_c coordinates is shown in Fig.8. Fig.9 shows the cyclotron resonances for a special tube (Nr 5) which was fitted with a special additional electrode. The effect of the cyclotron resonance on

Experimental Investigation of the Electron Conductivity of the Space-Charge Cloud in a Magnetron 109-1-14/18

the efficiency of a magnetron is illustrated by Figs.10. From the above results it is concluded that the calculated values for $\Delta P_{II}(ReX_b)$ and the experimental curves of $\Delta Y_{II} = \Delta G_{II} + j\Delta B_{II} = F(U_a)$ are in good agreement in the vicinity of the cyclotron resonance; however, in the vicinity of the synchronous layer the agreement is less satisfactory. At high cathode temperatures the calculated dynamic boundary coincides with the experimental results determined from the cyclotron resonance curve; at low temperatures the experiments are in better agreement with the formula for the static radius. The author makes an acknowledgement to N. Ya. Goncharov and Yu. T. Derkach. There are 10 figures and 10 references, 4 in English and 6 in Russian (4 of which are translated from English).

SUBMITTED: February 11, 1957

AVAILABLE: Library of Congress

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SOV/109-3-9-8/20

AUTHOR: Tychinskiy, V. P.

TITLE: Phase Velocity of the Space-Charge Waves (O fazovoy skorosti voln prostranstvennogo zaryada)

PERIODICAL: Radiotekhnika i elektronika, 1958, Vol 3, Nr 9, pp 1182-1192 (USSR)

ABSTRACT: In the simplest case of a narrow uniform electron beam, moving inside an ideally conducting cylinder, only two basic non-attenuated longitudinal waves can exist. Their phase velocities can be expressed by (Ref.1):

$$v_{\Phi 1} = \frac{v_o}{1 - \omega_q/\omega}$$

$$v_{\Phi 2} = \frac{v_o}{1 + \omega_q/\omega} \quad , \qquad (1)$$

where ω is the oscillation frequency, ω_q is expressed

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by Eq.(2) (this is the plasma oscillation frequency) and R is the coefficient taking into account the effect of the cylinder. The aim of this investigation is to determine the phase velocities (as expressed by Eq.1) as well as the beam velocity v_0. The experiments were done by means of the interferometer illustrated in Fig.1. One of the arms of the interferometer contains an electron phase shifter which is in the form of a travelling wave tube fitted with a drift tube having a length L. The second branch of the interferometer contains a coaxial line. The combining of the direct signal $\vec{A}_0$ and the signal passed through the phase shifter, $A_1 + A_2$, is done in the z-plane of the probe of the measuring line. If both the ends of the line are matched, the resulting field $\vec{A}_\Sigma$ can be expressed by:

$$\vec{A}_\Sigma = A_0 e^{-j\gamma(z)} + A_1 e^{-j(\varphi_1 - \varphi_2 + \psi_1)} + A_2 e^{-j(\theta_1 + \theta_2 + \psi_2)} \quad , \quad (10)$$

where φ_1 and φ_2 are the phase shift over the sections $a6$ and ϑz for the fast wave, θ_1 and θ_2 are the phase

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Phase Velocity of the Space-Charge Waves

shifts for the slow wave and $\gamma(z)$ is the phase change of the incident wave over a distance az (see Fig.1). The square of the amplitude can be expressed by Eq.(11). From this it is possible to investigate various special cases; thus, the interference of the slow wave and the direct signal is described by Eqs.(12), the interference of the fast wave and the direct signal is given by Eqs.(13), while the interference of the slow and fast waves is described by Eqs.(14); the beats of the three waves occur under the conditions expressed by Eqs.(15), where U_{Ap} denotes the voltage across the drift tube. The above equations were used to work out a suitable method of measurement. The measurements were carried out on two different tubes, having L = 15.7 cm and L = 4.4 cm . The first tube had helices of 3.5 and 2.0 cm while in the second the helices were of 11.0 and 4.8 cm. The ends of the helices were coated with aquadag. The amplification of the first tube was about 5 db and that of the second was 17 db at the operating current of

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Phase Velocity of the Space-Charge Waves

2 mA. The experimental results are shown in the oscillograms of Figs.2, 4 and 5 and in the graphs of Figs.3, 6 and 7. From the resulting data it is found that a good agreement is obtained between the experimental and the calculated results. Thus, it was found that the excitation of the fast wave takes place when the relative velocity parameter $b_1 = -6.5$, while the excitation of the slow wave occurs at $b_1 = 7$. When the amplitudes of the two waves are approximately equal, the phenomenon of beat waves is observed. From the oscillograms of Fig.2 it is seen that for the drift tube voltages ranging from 600 to 1100 V, no beats are observed and both the fast and the slow waves exist in "a pure form". The author makes acknowledgment to G. M. Khaplanov for his help in the measurements, to A. S. Tager and V. P. Solntsev for

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Phase Velocity of the Space-Charge Waves

the discussion of the results, and to G. I. Rukman and D. K. Akulina for their collaboration. There are 7 figures and 7 references; 3 of the references are English and 4 are Soviet.

SUBMITTED: February 1, 1957.

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TYCHINSKIY, V.P.; FEDOROV, V.G.

Traveling-wave oscillator with an electronic phase shifter. Radiotekh. i elektron. 4 no.2:241-245 F '59. (MIRA 12:2)
(Traveling-wave tubes)

SOV/109-59-4-2-11/27

AUTHORS: Tychinskiy, V.P., and Fedorov, V.G.

TITLE: A Travelling-Wave Tube Oscillator with an Electronic Phase Shifter (Generator na lampe begushchey volny s elektronnym fazovrashchatelem)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 2, pp 241-245 (USSR)

ABSTRACT: In 1950 one of the authors proposed a method of the electronic tuning of U.H.F. oscillators by employing an electronic phase shifter, which is in the form of a drift tube having a variable potential; such a drift tube inserted between two sections of a slow-wave system. The resulting oscillator is shown in Fig 1. The wavelength generated by the oscillator can be expressed by:

$$\lambda_o = \frac{L_\Sigma}{n_o}(1 + kV^{-1/2}) \qquad (4)$$

where

$$k = \frac{\ell}{L_\Sigma}\frac{c}{\eta}(1 \pm \frac{\omega_q}{\omega}) \qquad (5)$$

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In Eq (4) and (5), the parameter $L_\Sigma = L_0 + L_1 m_1 + L_2 m_2$ where L_0 is the length of the feedback path, L_1 and L_2 is the length of the helix and ℓ is the length of the phase shifter (See Fig 1); m_1 and m_2 are the delay coefficients of the two helices; n_0 is the number of the mode of the oscillation, ω_q is the effective plasma frequency, V is the potential of the drift tube and $\eta = (2e/m)^{1/2}$. The coefficient k of Eq (5) is proportional to the slope of the electronic tuning curve. The length of the electronic tuning was investigated ... the tube which had $L_1 = 11$ cm; $L_2 = 4.8$ cm; ... cm and $L_\Sigma = 505$ cm. The ... oscillation modes are shown ... number of this ... From the ... factor

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AUTHORS: Tychinskiy, V.P. and Karpetskiy, V.V.

TITLE: Investigation of a Single-Tuned Parametric Amplifier

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 4, pp 679-681 (USSR)

ABSTRACT: The note describes certain experimental characteristics of a single-tuned parametric amplifier operating at wavelength shorter than 10 cm. Gain factor as a function of excitation power, frequency variation of noise factor, threshold excitation power and gain factor, noise factor as a function of threshold excitation factor and gain factor in dependence on input power were measured. Acknowledgements are expressed to Yu.T.Derkach for his assistance in evaluating the results. There are 4 figures and 5 references, 2 of which are Soviet and 3 English.

SUBMITTED: August 17, 1959

Card 1/1

TYCHINSKIY, V.P.; DERKACH, Yu.T.

Oscillations of a space charge cloud in a cylindrical magnetron. Radiotekh. i elektron. 1 no.3:344-357 Mr '56. (MLRA 9:7)
(Oscillators, Electron-tube)

TYCHINSKIY, V.P.; DERKACH, Yu.T.

Oscillations of the space charge cloud in a cylindrical magnetron. Radiotekh. i elektron. 1 no.2:233-244 F '56. (MIRA 9:7)
(Oscillators, Electron-tube)

TYCHINSKIY, V. P.

TUBES & THERMIONICS

"Electron Conductivity of Space Charge Cloud in Magnetron," by V. P. Tychinskiy, Radiotekhnika i Elektronika, No 7, July 1957, pp 912-924.

A paper delivered at the Conference of the Scientific Technical Society for Radio and Electronics imeni A. S. Popov in May 1956. The article represents an attempt to calculate the electron conductivity of the magnetron for the case of small amplitudes, using the mathematical theory developed by Buneman and MacFarlane ("Wave Propagation in a Slipping Stream of Electrons: Small Amplitude Theory" Proceedings of the Physical Society, 1954, VLXIII, 6-D, 409). Differential equations are derived for the distribution of the tangential component of the field and a formula is obtained for the electron conductivity introduced into the resonator system. The results of the calculations of the conductivity, of the field, and of the energy flux are given. References are made to numerous other American and British papers.

Card 1/1

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757710015-7

М. А. Миллер

Ускорение плазменных сгустков высокочастотными электромагнитными полями.

10 июня.

(с 18 до 22 часов)

Д. И. Воскресенский,
Р. А. Грановская

Замедляющая система в виде спиральной канавки для ЛБВ

С. Г. Константинова

Отклоняющая система с бегущей волной.

Н. М. Блейвас,
И. И. Галицкая,
Н. М. Калинина,
Я. И. Местечкин

Исследование электронных явлений в пространстве взаимодействия приборов СВЧ с помощью автомата для построения траекторий заряженных частиц.

Г. А. Мачулка,
Е. Д. Наумченко

Замедляющая цепь типа фильтра для мощных ламп с бегущей волной дециметрового диапазона

34

11 июня

(с 10 до 16 часов)

Совместное заседание с секцией ферритовых устройств СВЧ

В. Н. Зубков, М. С. Моносов

Некоторые вопросы теории параметрических усилителей

В. П. Тычинский

К теории ферритового усилителя.

В. П. Тычинский,
Ю. Т. Деркач,
В. В. Королевский

Экспериментальное исследование ферритового усилителя

А. Л. Микаэлян,
И. З. Шкарин

Некоторые результаты исследования ферритовых усилителей.

А. С. Тагер

К теории параметрического усиления в волноводных системах.

35

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORiE), Moscow, 8-12 June. 1959

"APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757710015-7

TYCHINSKIY, V. P.

М. Л. Цетлин,
Л. М. Шестаков

О синтезе одного класса схем на ферротранзисторных элементах.

II. СЕКЦИЯ ФЕРРИТОВЫХ УСТРОЙСТВ СВЧ

Руководитель А. Л. Микаэлян

11 июня

(с 10 до 16 часов)

Совместное заседание с секцией электроники

В. М. Зубков,
М. С. Нейман

Некоторые вопросы теории параметрических усилителей.

В. П. Тычинский

К теории ферритового усилителя.

В. П. Тычинский,
Ю. Т. Дорман,
В. В. Корнецкий

Экспериментальное исследование ферритового усилителя.

68

А. Л. Микаэлян,
Н. З. Шварц

Некоторые результаты исследования ферритовых усилителей

А. С. Тагер

К теории параметрического усиления в волноводных системах.

11 июня

(с 18 до 22 часов)

А. А. Пистолькорс,
Сюй-Яо-Шень

Колебание малой гиротропной сферы в поле плоской волны.

А. Л. Микаэлян,
В. Я. Антоньянц

Смешение сверхвысоких частот в ферритах.

А. Л. Микаэлян,
А. К. Столяров

О ферритовых вентилях предельного типа

А. Л. Микаэлян,
И. Г. Тейтельбаум

Применение ферритов для управления частотой электромагнитных волн

69

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORIE), Moscow, 8-12 June, 1959

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757710015-7"

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S/109/60/005/04/020/028
E140/E435

AUTHORS: Tychinskiy, V.P., Fedorov, V.G. and Savilov, P.I.

TITLE: Regenerative Amplifier-Converter Using Diodes with Nonlinear Capacitance

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 4, pp 677-679 (USSR)

ABSTRACT: A regenerative amplifier-converter using the nonlinear capacitance of a semiconductor diode, based on the Manley-Rowe theorem (Ref 1), has been built and studied. The gain and noise factor at frequencies between 200 and 1000 Mcs were measured. At 750 Mcs the gain is of the order of 20 to 35 dB practically constant for input power levels of 10^{-6} to 10^{-5} W. The noise factor was 1.25 to 2.0 dB. The conversion gain did not exceed 3 to 5 dB. Acknowledgements are expressed to Yu.T.Derkach for his assistance in evaluating the results. There are 2 figures and 4 English references.

SUBMITTED: August 17, 1959

Card 1/1

Tychinskiy, V. P.

ELECTRON PHYSICS

"Experimental Investigation of the Electron Conductivity of a Space Charge Cloud in a Magnetron", by V.P. Tychinskiy, Radiotekhnika i Elektronika, No 1, January 1958, pp 116-130.

This paper was delivered at the Day of Radio Conference held in May 1956. It describes the procedures, and measurement results on the electron conductivity and on the cyclotron resonance curves of magnetrons, and compares these results with calculated values obtained by the author in an earlier paper (Radiotekhnika i Elektronika, 1957, Vol. 2, No 7, page 112). Good qualitative agreement is shown frequently, and frequently also quantitative agreement, with the calculations and anomalies of the elctronic efficiency of magnetrons, due to the resonant layers produced in the space charge cloud, are explained. The author indicates that some of the most recently published work in this field (D. Reverdin, Journal of Applied Physics, 1951, 22, 257; L.E.S. Mathais (Journal of Electronics, 1955, Vol 1, No 1, page 18; and H.C. Nedderman, Journal of Applied Physics, 1955, Vol 26, No 12, page 1420) are in contradiction with each other.

Card 1/1

SOV/112-58-2-2525

A Method of Producing Power From Beta-Active Isotopes

winding of which supplies a load. A simplified scheme of an atomic battery is presented; its power and efficiency are calculated; with 10^5 curie β-source activity, with an average β-particle energy of 100-kev, and with a 100-$\mu\mu$f capacitor, the optimum charging time that corresponds to the maximum efficiency (20.5%) is 20 microseconds, the capacitor voltage is 70 kv, and the mean output power is 13 w. With a 10:1 transformer ratio, the equivalent battery resistance is on the order of hundreds of ohms. The S^{35} sulfur isotope, with an average energy of about 100 kev and a half-life of 87.1 days, is recommended as a source of β-radiation. Bibliography: 8 items.

E.A.G.

Card 2/2

TYCHINSKIY, V.P.

Phase velocity of space charge waves. Radiotekh. i elektron. 3 no.9:1182-1192 S '58. (MIRA 11:10)
(Microwaves--Measurement)

TYCHINSKIY, V.P.

Experimental investigation of electron conductance of a space charge cloud in the magnetron. Radiotekh. i elektron. 3 no.1: 116-130 Ja '58. (MIRA 11:2)

(Magnetrons)

Tychinskiy, V.P.

AUTHORS: Tychinskiy, V.P., and Fedorov, V.G. 109-10-16/19

TITLE: Frequency Changing in a Travelling-wave Tube Fitted with a Drift Tube (Preobrazovaniye chastoty v LBV s trubkoy dreyfa)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol.II, No.10, pp. 1306 - 1307 (USSR).

ABSTRACT: It was shown earlier by one of the authors (Radiotekhnika i Elektronika, 1956, Vol.I, No.12, p.1525) that if the potential of the drift tube in a travelling-wave tube is varied in accordance with the hyperbolic law as given by Eq.(1), the change of frequency in the tube is expressed by Eq.(2) where ℓ is length of the drift tube, v_0 is the electron velocity and a is the rate of change of the drift tube potential. Some experiments were carried out on a tube having $\ell = 15.7$ cm and it was found that the change in frequency did, in fact, occur and that Eqs.(1) and (2) were accurate to within 6%.

SUBMITTED: March 12, 1957.

AVAILABLE: Library of Congress.

Card 1/1

TYCHINSKIY, V.P.

Electronic conductance of a space charge cloud in the magnetron. Radiotekh. i elektron. 2 no.7:912-924 Jl '57. (MLRA 10:9)
(Magnetrons)

Tychinskiy, V.P.

Category : USSR / Radio Physics. Generation and Conversion of Radio-Frequency Oscillations I-4

Abs Jour : Ref Zhur - Fizika No 3, 1957, No 7261

Author : Tychinskiy, V.P., Derkach, Yu. T.

Title : Oscillations of a Space Charge Cloud in a Cylindrical Magnetron

Orig Pub : Radiotekhnika i elektronika, 1956, 1, No 2, 233-244; No 3, 344-357

Abstract : The article is devoted to a study of oscillations in a magnetron whose frequency is not related to the parameter of the resonator system. In the first part, the energy method is used to determine the condition under which the static state of the electron cloud becomes unstable upon appearance of a synchronous layer. It is shown that the well-known Hartree function determines the natural frequencies of the electron cloud and its dynamic stable limit. A diagram is obtained for determining the possible spectrum of the oscillations of the space charge cloud. The effect of dispersion os the waves on the spectrum of the oscillations is steady. It is established that the dispersion of the waves in the electron stream leads to a limitation of the spectrum of the

Card : 1/2

Category : USSR / Radio Physics. Generation and Conversion of Radio-Frequency Oscillations I-4

Abs Jour : Ref Zhur - Fizika No 3, 1957, No 7261

excited frequencies and to a deviation from the Hartree formula, a deviation which increases with the diminishing number of the type of oscillation. An experimental investigation of the oscillations of the electron cloud have been carried on the series of multi-resonator magnetrons with cathodes of various types (tungsten direct-heated, tantalum, and indirectly-heated oxide cathodes). The apparatus and the experimental procedure are described. Oscillograms are given for the oscillation zones and for their spectral composition. The common features of the behavior of the oscillations in different magnetrons, regardless of the difference in their construction and dimensions, are pointed out. The existence of dispersion of the waves in the electron beam is experimentally confirmed. The periodic structure of the oscillation zones is established. The results of the experiments are in good agreement with the theoretical derivations of the first part of the article. Bibliography, 20 titles.

Card : 2/2

TYCHINSKIY, V.P.

109-7-2/17

AUTHOR TYCHINSKIY, V.P.

TITLE Electronic Conductance of a Space Charge Cloud in a Magnetron (Elektronnaya provodimost' oblaka prostranstvennogo zaryada v magnetrone. Russian)

PERIODICAL Radiotekhnika i Elektronika, 1957, Vol 2, Nr 7, pp 912-924 (U.S.S.R.)

ABSTRACT The existence of single current (Brillouin) cloud is assumed and a differential equation for the distribution of the tangential component of the high-frequency field in the cross section of the flow is obtained for small amplitudes of oscillation from the system of MAXWELL equations and equations of motion in EULER'S form. The electronic conductance determined on the surface of the flow essentially depends on the position of the synchronous or resonance layer with regard to the limits of the flow. It is shown that a great decay and change in sign of the idle component takes place, if the limit is exceeded through the resonance layer. It is shown that the presence of a synchronous layer within the cloud near the surface leads to the occurrence of the negative action component of conductance, that is to an amplification or to an excitation of oscillations. The distribution of the tangential component of the field in the cross section indicates a distinct maximum in the vicinity of the resonance layer and a minimum in that of the synchronous layer. The distribution of density in the flow of electromagnetic energy in the beam cross sec-

Card 1/2

Electronic Conductance of a Space Charge Cloud in a Magnetron

tion indicates the dominating part in the formation of negative conductance in the synchronous and surface layers. The resonance layer "accumulates" the fluctuation energy and in it form electrons with excess energy. In the presence of electromagnetic excitations in the bunch there takes place, due to the strong linkage of individual layers, a new distribution of kinetic electronic energy in the sliding flow. But since fluctuation fields are present in every real system, the condition of a uniform charge is unstable. (6 illustrations, 2 Slavic references).

ASSOCIATION Not given
PRESENTED BY
SUBMITTED
AVAILABLE Library of Congress

Card 2/2

TYCHINSKIY, V.P.

109-7-10/17

AUTHOR: Tychinskiy, V.P.

TITLE: Electron Admittance of the Cloud of the Space Charge in a Magnetron. (Elektronnaya provodimost' oblaka prostranstvennogo zaryada v magnetrone)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol.II, No.7, pp. 912 - 924 (USSR)

ABSTRACT: The paper was read at the Conference NTO RiE imeni A.S. Popov, May, 1956.
A segment of an infinitely long (in the direction of the z axis) interaction space is considered. The space has a comparatively large width in the direction x (see Fig.1), so that the edge effects can be neglected. Under the above conditions, all the processes occurring in the interaction space can be regarded as being independent of the co-ordinate x and the system can be solved as a two-dimensional problem. The interaction space is limited by the cathode surface ($y = 0$) and the a plane passing through the ends of the resonators ($y = d$). The magnetic field b is directed along the axis z. The analysis of the system is carried out under the following assumptions: 1) admittance of the cathode surface is infinite while that of the delay system is finite; 2) distribution of the electron velocities and the space-

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Electron Admittance of the Cloud of the Space Charge in a Magnetron.

charge density obeys the Brillouin law and the initial electron velocities are zero; 3) perturbations of the initial state are comparatively small, i.e. only small signals are considered; 4) the electron velocities are small in comparison with the velocity of light; 5) the electrons interact with a wave of the TM type. The interaction space is divided into two regions, that of the unperturbed electron current and the region of the perturbed electron current (see Fig.1). Solution of the Maxwell equations in the region I is given and the electron current admittance is defined by:

$$Y_I = \left. \frac{H_x}{E_z} \right|_{y=b}$$

so that the normalised admittance is given by:

$$P_I = \frac{Y_I}{jY_o} = \frac{1}{X_b^3} + \left(1 - \frac{1}{X_b^2}\right) \frac{1}{E_z} \frac{dE_z}{dX} \qquad (16)$$

Electron Admittance of the Cloud of the Space Charge in a Magnetron.

in which:

$$X = \frac{\omega}{\omega_c} - hy \ . \qquad (13)$$

In the region II, the expression for the admittance is given by:

$$P_{II} = \frac{1 - P_I \mathrm{cth}(y - b)h}{P_I - \mathrm{cth}(y - b)h} \ . \qquad (22)$$

Expressions for the eigen functions of the system are also found and its perturbed electron admittance is evaluated. The resulting curves for the region II are plotted against X_b in Fig.5. Finally, equations for the field distribution across the cross-section of the electron stream are given and the values of E_z are found (see Fig.6, p.922). The author expresses his appreciation to N.S. Chugunova for her help in carrying out the complex and laborious calculations which were necessary for this paper. There are 6 figures and 12 references, of which 2 are Slavic.

109-7-10/17

Electron Admittance of the Cloud of the Space Charge in a Magnetron.

SUBMITTED: January 15, 1957.

AVAILABLE: Library of Congress.

Card 4/4

TYCHKIN, V., pomoshchnik direktora po kul'turno-vospitatel'noy rabote.

Patronizing collective farms. Prof. -tekh.obr. 11 no.2:32 '54.
(MLRA 7:6)

(Farm mechanization)

TYCHKOV, I., nauchnyy sotrudnik

Contact gas water heaters. Na stroi. Ros. 3 no.3:35-36 Mr '62.
(MIRA 16:2)

1. Akademiya kommunal'nogo khozyaystva im. K.D.Pamfilova.
(Water heaters)

TYCHKOV, I.N.

Using contact gas water heaters in communal housing projects. Nov. tekh.zhil.-kom khoz.: Blagoustr.gor.no. 2:100-114 '62. (MIRA 17:6)

1. Nauchnyy sotrudnik Akademii kommunal'nogo khozyaystva imeni K.D.Pamfilova.

MUROMSKIY, S.N.; SOSNIN, Yu.P.; TYCHKOV, I.N.; KHMEL'NITSKIY, S.A.

Gas contact water heaters and prospects for their use. Sbor. nauch. rab. AKKH no.9:3-17 '61. (MIRA 16:1)
(Water heaters)

ACC NR: AT6028386 (N) SOURCE CODE: UR/0000/65/000/000/0243/0256

AUTHOR: Anashin, Yu. F.; Gavelya, A. P; Kirillov, V. N.; Tychkova, M. V.

ORG: none

TITLE: Geophysical investigations in searching for water in desert and semidesert areas of Kazakhstan

SOURCE: International Geological Congress. 22d, New Delhi, 1964. Geologicheskiye rezul'taty prikladnoy geofiziki (Geological results of applied geophysics); doklady sovetskikh geologov, problema 2. Moscow, Izd-vo Nedra, 1965, 243-256

TOPIC TAGS: prospecting, geophysic expedition, underground water, geophysic prospecting, ~~depression, resistivity,~~ tellurometry, water, desert/Kazakhstan

ABSTRACT: Numerous geophysical investigations in searching for water have been conducted in Kazakhstan during recent years. In addition to surveys based on special techniques, wide use has been made of the information available from other types of geophysical investigations conducted in the areas of interest. A summary prognostic map of fresh-water development in the nothern part of the Turgay depression has been compiled from the resistivity maps made from vertical electrical-sounding measurement. Large areas of the deserts in central and southern Kazakhstan have previously been considered arid. In these areas intrusive and effusive rocks are either exposed or covered by thin loose deposits. Geophysical methods have been used in prospecting for water fracture deposits. The areas favorable for drilling water wells have been selected. Different modifications of resistivity profiling and magnetic and gravity prospecting have been applied. Geophysical investigations for water have proved

ACC NR: AT6028386

highly effective in Kazakhstan. Boreholes and pits sunk at sites recommended by geophysicists have struck potable water in 287 of 322 localities. The experience of the geophysicists of Kazakhstan can be of great use in prospecting for water in desert and arid regions of Asia and Africa under similar geohydrological conditions. Orig. art. has: 7 figures.

SUB CODE: 08/ SUBM DATE: 06Jan65/

Card 2/2

L 42121-66

ACC NR: AT6028379 SOURCE CODE: UR/0000/65/000/000/0142/0154

AUTHOR: Bachin, A. P.; Bekzhanov, G. R.; Brodovoy, V. V.; Gol'dshmidt, V. I.; Zhivoderov, A. B.; Zlavdinov, L. Z.; Ivanov, O. D.; Klenchin, I. N.; Kolmogorov, Yu. A.; Kotlyarov, V. M.; Kuz'min, Yu. I.; Kuminova, M. V.; Kunin, N. Ya.; Lyubetskiy, V. G.; Melent'yev, M. I.; Morozov, M. D.; Tret'yakov, V. G.; Tychkova, T. V.; Tsaregradskiy, V. A.; Eydlin, R. A.

ORG: none

TITLE: Geophysical sketch map of Kazakhstan

SOURCE: International Geological Congress. 22d, New Delhi, 1964. Geologicheskiye rezul'taty prikladnoy geofiziki (Geological results of applied geophysics); doklady sovetskikh geologov, problema 2. Moscow, Izd-vo Nedra, 1965, 142-154

TOPIC TAGS: ~~Kazakhstan~~ geophysics, map, ~~geophysical mapping~~, tectonics ~~tion~~ regional study

ABSTRACT: On the basis of regional geophysical and geological investigations (seismic, gravimetric, magnetoelectric), a composite geophysical sketch map of the physical fields of Kazakhstan has been compiled. From this map, the major tectonic zones, deep structures, and geological structural zones are defined. Long zones representing high field gradients in the gravitational and magnetic fields reflect deep geosutures, which seismic sounding data suggest are scarps in the M-discontinuity

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L 22131-66

ACC NR: AT6028379

Among the major structural zones of Kazakhstan defined are: 1) the Turgayskaya, 2) the Petropavlovskaya, 3) the Uspenskaya, 4) the Tokrauskaya, and 5) the Dzhalair-Naymanskaya. Regions of magmatism are also defined. In the tectonic depression zones, contour lines indicate the thickness of the sedimentary cover, overlying the folded basement, and possible oil-bearing formations. Orig. art. has: 1 figure. [DM]

SUB CODE: 08/ SUBM DATE: 06Jan65/ ATD PRESS: 5063

Card 2/2

TYCHINKINA, A.K., kandidat meditsinskikh nauk; TSAREGRADSKAYA, G.A. (Gor'kiy)

The feldsher's work in accident prevention at the health stations of a lumbering enterprise. Fel'd. i akush. 21 no.5:18-22 My '56. (MIRA 9:8)
(LUMBERING--ACCIDENTS)

TYCHINSKII, V. I.

Tychinskii, V. I. "Exploring for Quartz Veins by Means of Geophysical Methods." Zolotaia Promyshlennost, Moscow, No. 11, 1938, pp. 20-22.

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001757710015-7"

212

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TUCHOWSKI, F

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... Heat Treatment with Application ...

TYCHOWSKI, F.

Studies of some functions of the theory of plasticity. p. 3.

ARCHIWUM HUTNICTWA. (Polska Akademia Nauk. Komitet Hutnictwa) Warszawa, Poland. Vol. 4, no. 1, 1959.

Monthly list of East European Accessions Index (EEAI), LC, Vol. 8, no. 6, June 1959 uncla.

TYCHOWSKI, F.

Long-range tasks of scientific endeavor in the field of the metal-forming technique. p. 673.

PRZEGLAD MECHANICZNY. (Stowarzyszenie Inzynierow I Techikow Mechanikow Polskich) Warszawa , Poland. Vol. 18, no. 21, Nov. 1959.

Monthly List of East European Accessions (EEAI) LC, Vol. 9, no. 2, Feb. 1959. Uncl.

POL/39-26-3-2/13

18(5)

AUTHOR: Tychowski, F., Professor, Profector

TITLE: Discussion on the Pressure on Rolls and Roller Bearing Durability in Hot and Cold Rolling Mills

PERIODICAL: Hutnik, 1959, Vol 26, Nr 3, pp 97-98 (Poland)

ABSTRACT: The author draws attention to the advantages of this nomogram and outlines that it is only applicable to roller bearings but not to ball bearings. In his opinion, this nomogram should be partly applicable to taper roller bearings and double-conical roller bearings (roller bearings with casklike shape) if the factor "p" can be determined accordingly. For the determination of the factor "p" he mentions values for x. P_r and y. P_a as obtained by the firm of SKF. For taper roller bearings is x = 0.5, y = 0.75 - 2.2, for double-conical roller bearings is x = 1, y = 2.9 - 5.8. The author comments on the unit of the lifetime of roller bearings L_u(1) in which durability in hours and the number of rotations are contained as well as on the determination of the above from L_h and n_h. The

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POL/39-26-3-2/13

Discussion on the Pressure on Rolls and Roller Bearing Durability in Hot and Cold Rolling Mills

resulting value for L_{uc} corresponds to a capacity of one million rotations. He repeats the old and the new method of determination of f_h and f_n. He further adds a new factor "f_t" to the equations which takes into consideration the temperature of the rollers which should all serve to improve the nomogram.

ASSOCIATION: Czlonek Zwyczajny Niemieckiej Akademii Nauk Freiburg (NRD) (Member of German Academy of Sciences, Freiburg (Eastern Germany), Polytechnic College Poznan)

SUBMITTED: October 16, 1958

Card 2/2

P/038/61/006/003/001/003
E193/E180

AUTHOR: Tychowski, Feliks

TITLE: Forces in reverse redrawing of cylindrical and square shells

PERIODICAL: Archivum hutnictwa, v.6, no.3, 1961, 169-196

TEXT: [Abstractor's note: When the final dimensions of a deep drawn cup are such that it cannot be produced by 1-stage pressing, redrawing is necessary. When this operation is carried out in such a manner that the external surface of the first stage shell becomes the internal surface of the redrawn shell, that is when the whole shell is turned inside out, it is referred to as reverse redrawing. It is with this process that the present paper is concerned.]
Based on a hypothesis of the limiting deformation energy, a general theory of reverse redrawing was presented by the present author together with Z. Wiśniewski in 1956. This theory was later modified by the present author (Ref.3: Obróbka Plastyczna 1959, no.1, 11/54) in such a way that it could be used for the construction of nomograms taking into account both the effect of

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blank-holding pressure and the possibility of using arbitrary friction coefficient; a theory of reverse redrawing of square shells was also formulated and the limits of applicability of this process were experimentally determined. In formulating this theory and in deriving the formulae for the punch loads required in reverse redrawing, the present author made several simplifying assumptions. A critical analysis of these formulae is carried out in the present paper whose main object was to check whether the assumptions mentioned above are permissible, and to determine to what extent they affect the accuracy of calculations. In deriving the formulae for the punch loads it was postulated that the tensile stress in the straight wall of a redrawn component is a sum of stresses due to: (a) reduction in diameter of the shell, (b) bending and unbending of the wall, and (c) friction between the shell and the tools (die, punch, and blank-holder). Similar considerations apply to the rounded corners of rectangular pressings; for simplicity, it was also assumed that only stresses due to bending, unbending and friction arise in the straight walls. It is shown in the present paper that, if correct values of punch load are to be obtained, the effect of increasing wall thickness during the drawing and redrawing operations must be taken into account, since not only is the cross-section area thereby increased, but an increase in the strength of material is brought about as a result of tri-axial strains. It is also shown that the punch load depends on the shape of the blank-holder and on the location of the point of contact between the blank-holder and the shell. The beneficial effect of a concave blank-holder (indispensable in the reverse redrawing of thin-walled shells) is shown to be more pronounced when it contacts the shell at the top of the redrawing die. The validity of the formulae analysed and of conclusions reached by the present author was checked experimentally. Coefficient of friction was determined from the force required to maintain sliding of a strip (cut from the steel sheet) over a ring (made from the tool steel); values of 0.09 to 0.12 were found with lubricants composed of a heavy mineral oil with 15% graphite or 20% rape-seed oil as additives. Resistance to deformation was measured on cylinders composed of steel circles cut from the sheet; the effect of friction was eliminated

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Forces in reverse redrawing of ....

according to the method of Cook and Larke (Ref.11: M. Cook, E.C. Larke, "Resistance of copper and copper alloys to homogeneous deformation in compression", J. Inst. of Metals, 1945, pp.371/90). The obtained values were used in theoretical calculations of the punch loads which were also determined experimentally during reverse redrawing of both cylindrical and square steel shells. Some of the results are tabulated below. Satisfactory agreement between the theoretical and experimental results was taken to indicate that the formulae derived by the present author as well as the method of determining the friction coefficient and the stress-strain diagrams employed in the course of the present investigation can be applied to industrial practice. G.A. Smirnov-Alayev, D.A. Vayntraub, G.I. Sukhanov, L.A. Shofman, Z. Marciniak, Professor M.T. Huber and W.N. Belayev are mentioned for their contributions in this field.
There are 8 figures, 1 table and 12 references: 9 Soviet-bloc and 3 non-Soviet-bloc. The English language references read:
Ref.1: S.J. Chung. "Stress analysis of reverse redrawing of cylindrical shells", Sheet Metal Ind. 1951, 45.

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Forces in reverse redrawing of ....

Ref.11: as quoted in the text above.

SUBMITTED: March 30, 1960

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Table

Wall thickness, mm	Surface and heat treatment	Shell diameter, mm		Punch loads, kg.	
		Before redrawing	After redrawing	Experi-mental	Calculated
0.5	S	45.25	35.75	4190	3458
0.5	M	45.25	35.75	3160	2627
0.5	T	45.25	30.75	3340	3280
1.0	S	45.5	33.5	5986	6027
1.0	M	45.5	35.5	4436	4262
1.0	T	45.5	33.5	4620	5054

Note: S - The shell was redrawn after drawing without intermediate annealing.
M - The shell was annealed before redrawing.
T - The surface of the shell was etched before redrawing.

Z/032/61/011/003/004/005
E073/E335

AUTHOR: Tychowski, F., Professor Engineer Doctor

TITLE: Method of Determining the Resistance to Forming

PERIODICAL: Strojírenství, 1961, Vol. 11, No. 3, p. 236

TEXT: Summary of a paper presented at a conference of the Czechoslovak Scientific and Technical Society, Prague, held from September 13 - 15, 1960.
The author presented a method of calculation of the stresses on the "roll nuts" and used the derived equations for plotting nomograms. Results of experiments with strain gauges showed good agreement with results calculated according to his theory.
(This is a complete translation.)

ASSOCIATION: Central Laboratory for Forming Without Machining, Poznan, Poland

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TYCHOWSKI, Feliks, prof., dr., inz.

Economical problems connected with deep drawing in Poland. Przegl mech 20 no.17:510-517 '61.

1. Centralne Laboratorium Obrobki Plastycznej, Poznan.

(Drawing(Metalwork)

TYCHOWSKI, Feliks, prof. dr inz.

"Mechanics of press forming processes from metal plates" by [doc. dr] Zdzislaw Marciniak. Reviewed by Feliks Tychowski. Przegl mech 21 no.1:31 10 Ja '62.

TYBALKO, F. P.

Category : USSR/Solid State Physics - Mechanical Properties of Crystals and Crystalline Compounds. E-9

Abs Jour : Ref Zhur - Fizika, No 3, 0957, No 6816

Author : Tybalko, F.P.

Title : Fragmentation of the Surface of Polycrystalline Metals in Sign-Reversing Tortion.

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 3, 514-520

Abstract : An investigation was made of the distribution of macrocracks occurring in sign-reversing tortion on the surface of cylindrical specimens. Various frequencies of sign reversals in the deformation and deformation amplitudes per cycle have been employed. Many polycrystalline metals, such as copper, brass, aluminum, lead, tin, and zinc with its alloys with aluminum have been used to establish that in case of viscous failure, regardless of the frequency of sign reversal and of the value of the deformation amplitude during the cycle, the surface of the specimens is fragmented by macrocracks into a system of rectangular blocks, the sides of which are directed along the planes of the maximum cleavage stresses.

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TYBALKO, F. P.

Category : USSR/Solid State Physics - Mechanical Properties of Crystals and Crystalline Compounds. E-9

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6816

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TYBALKO, F. P.

Category : USSR/Solid State Physics - Morphology of Crystals. Crystallization E-7

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6698

Author : Tybalko, F.P.
Inst : Ural' University, Sverdlovsk
Title : Concerning the Problem of the Anisotropy of the Speed of Growth of Crystals.

Orig Pub : Fiz. metallov i metallovedeniye, 1955, 3, No 1, 184-185

Abstract : A cylindrical bicrystal of aluminum was grown by passing a tube with molten aluminum (99.98%) through an electric furnace. The separation boundary of the crystals appears on the photograph as a sawtooth line that parallels the generatrix of the cylinder. The longer sides of the teeth form an angle of 10° with the axis of the cylinder. The appearance of the teeth corresponds to the periodic oscillations of the temperature (±3°) during the course of operation of the thermostat. An X-ray diffraction investigation has shown that for one of the crystals the plane of the joint between the crystals, which makes an angle of 10° with

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TYBALKO F.P.

Category : USSR/Solid State Physics - Morphology of Crystals. Crystallization E-7

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Title : Concerning the Problem of the Anisotropy of the Speed of Growth of Crystals.

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Category : USSR/Solid State Physics - Morphology of Crystals. Crystallization E-7

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6698

the x axis, is the crystallographic plane (112). In order to obtain full coincidence of the orientations of the two crystals it is necessary to rotate the second crystal by 130° about the z axis, which is perpendicular to the x axis. On the basis of the experiment described, the author concludes that the rate of crystal growth has a different temperature dependence in different directions.

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TYBITANCL, J. Toward new trends in research and technical development of our construction industry. p. 62.

Monthly List of East European Accession (EEAI) LC Vol. 8, no. 5 May 1959. Unclass.

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TYBITANCL, J

Using substitute materials we can improve the quality of building.
p. 170. POZEMNI STAVBY. (Ministerstvo stavebnictvi) Praha. Vol. 3, no. 4, April 1955.

SOURCE: East European Accessions List (EEAL), Library of Congress, Vol. 4, No. 12, December 1955

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